March/April 1999 $2.50

MONTANA OUTDOORS

MONTANA OUTDOORS

March/April 1999
Volume 30, Number 2

Features

1 FWP's 1998 Annual Report
A summary of FWP goals and priorities, project highlights, and a budget breakdown.

7 Colors of Survival
by Sam Curtis
Have you ever wondered how protective coloration evolved in many animals, birds, reptiles, and insects?

12 Saving the Pallid Sturgeon: New Hope for an Old Fish
by Bruce Auchly
An innovative stocking program may be our last best chance to save an endangered contemporary of *Tyrannosaurus rex*.

17 Rossberg Wins 1999 Migratory Bird Stamp Contest
by William Phippen
Great Falls artist Cliff Rossberg's painting of two Barrow's goldeneyes took first place in this year's stamp competition.

20 An Owl for All Times
by Jerry Kustich
The short-eared owl is an efficient night predator, but also hunts during the day.

25 Taking a Fling at Ling
by Steve Dalbey
The burbot won't win any beauty contests, but it's No. 1 in the hearts of a dedicated corps of ice anglers.

Departments

28 Catchall—Mikal Kellner wins "The Vinnie"
31 From the Field—A new species of bat is documented in Montana
32 Readers Respond
34 Bookshelf
37 Contributors

Covers—White-tailed ptarmigan by Donald M. Jones
Short-eared owl by Jim Petek

JOHN G. OBREY JR

A praying mantis demonstrates the advantages of natural camouflage (p.7).

State of Montana
Marc Racicot/Governor

Montana Fish, Wildlife & Parks Commission
Stan Meyer/Chairman
Dave Simpson/Vice Chairman
Darlyne Dascher
Charles Decker
Tim Mulligan

Montana Fish, Wildlife & Parks
Patrick Graham/Director
Dave Mott/Chief of Administration and Finance
Chris Smith/Chief of Staff
Arnold Olsen/Chief of Operations

Conservation Education Division
Ron Aasheim/Administrator

Montana Outdoors Staff
Dave Books/Editor
Bev Veneziano/Art Director
Debbie Sternberg/Circulation Manager

For address changes or other subscription information call
800/678-6668

Montana Outdoors (ISSN 0027-0016), the official publication of Montana Fish, Wildlife & Parks, is published bimonthly (January, March, May, July, September, and November). Contributions (manuscripts or illustrations) are welcome with the understanding that the department or the editor cannot be responsible for loss or damage. All contributions will be published at the discretion of the editor. Subscription rates are $9 for one year, $16 for two years, and $22 for three years. (Please add $3 per year for Canadian subscriptions. All other foreign subscriptions, air mail only, are $25 for one year.) Individual copies and back issues cost $3.50 each (includes postage). Although *Montana Outdoors* is copyrighted, permission to reprint articles is available by writing our office or phoning us at 406/444-2474. All correspondence should be addressed: *Montana Outdoors*, Montana Fish, Wildlife & Parks, 930 West Custer Ave., P.O. Box 200701, Helena, MT 59620-0701 or e-mail at mtoutdrs@ixi.net.
©Montana Fish, Wildlife & Parks, 1999. All rights reserved.
Indexed by States' Periodical Index, 1660 Smithville Road; Havre, MT 59501.

Postmaster: Send address changes to *Montana Outdoors*, Montana Fish, Wildlife & Parks, 930 West Custer Ave., P.O. Box 200701, Helena, MT 59620-0701. Preferred periodicals postage paid at Helena, MT 59620, and additional mailing offices.

Montana Fish, Wildlife & Parks

1998 ANNUAL REPORT

An annual report chronicles many important actions taken over the course of a year—acres of land conserved, access purchased, habitat restored, and poachers prosecuted. More difficult is capturing the breadth of commitment and perseverance that is at the heart and soul of Montana's fish, wildlife, and parks.

In 1998, a man who by all accounts was a teacher of teachers, whose knowledge of Montana's history exceeded those who created it, and who championed Bannack State Park, the birthplace of his father, passed away. Commissioner Dale Tash dedicated a lifetime to enjoying and conserving Montana's fish, wildlife, and parks.

The year 1998 also marked the settlement of a major portion of a Natural Resources Damage Lawsuit with ARCO on the upper Clark Fork River near Butte. The $215 million settlement is part of a major program to restore a watershed damaged from nearly a century of mining. Many had written the river off. The lawsuit was filed by Fish, Wildlife & Parks nearly two decades ago.

The resources we manage and protect have been around for a hundred, 10,000, and in some cases, a million years. As we celebrate the accomplishments of this year, let us be mindful of the vision and actions of those who preceded us and the awesome responsibility they have placed in our hands. Montana — it's our way of life.

Pat Graham

Patrick J. Graham, Director

• Nearly all of FWP's field personnel joined in providing the hunting opportunities made possible through the agency's highly popular Block Management Program. In 1998, the program, which provides public hunting access to private land, featured 719 individual Block Management Areas encompassing nearly 7.3 million acres. Over 900 private landowners now cooperate in the program.

the public with an overview of the extent of Montana's FAS program.

• FWP completed a summary of 1996 and 1997 visitation information to state parks and fishing access sites, with comparisons to previous years. Among the findings: resident visitation to Montana state parks increased from 49 percent of total visits in 1988 to 71 percent in 1997.

site. The center will be opened in the summer of 1999.

• 1998 was another great year for FWP's statewide intern program. FWP placed a total of 28 student interns who worked a total of 11,400 hours, or the equivalent of 5.5 full-time employees. The program continues to be a very valuable option for FWP when work needs to be done and resources to accomplish it are not available.

In striving to reach our goals we are...

...providing quality

Opportunities

MIKE BARLOW

• Construction of the visitor center at Ulm Pishkun State Park is nearing completion and interpretive displays are in production. FWP staff provided professional oversight to the development of Ulm Pishkun Visitor Center interpretive components, including conducting daily critiques of materials and finding outside professionals in history, archaeology and native oral traditions to assist in interpreting the

• 1998 marked the eighth year of the statewide volunteer program within Montana state parks and each year the numbers continue to climb. In 1998, 1,396 volunteers in state parks (an increase from 1,134 in 1997) worked a total of 47,235 hours, a 14 percent increase from 1997. The efforts of these volunteers saved FWP estimated labor costs of $278,687.

• After several monrhs' work, Montana's Private Land/Public Wildlife Advisory Council developed recommendations that address FWP's Block Management Program and growth of the outfitting industry. The council developed final recommendations in November for submission to the Governor in the form of a final report in December. Those requiring legislative action will be introduced during Montana's 1999 legislative session.

• Information on all of Monrana's fishing access sites was gathered and compiled into a statewide brochure. The brochure has been very popular and has provided

MICHAEL JAVORKA

MIKE BARLOW

• Forty-eight fisheries habitat improvemenr projects were approved for funding through Montana's Future Fisheries Improvement Program in 1998. These projects funded nearly $1.7 million in habitat improvements at a program cost of $770,000.

• The Water Watch Volunteer Program in northwestern Montana, initiated in 1996, was again extremely active in 1998. Volunteers acting as information conduits for FWP distributed pamphlets and information to boaters.

...creating a satisfying work environment

• In September, numbers of FWP managers and staff from across the state gathered in West Yellowstone for "Leadership '98," a meeting to examine FWP's present management systems and operations and help chart a course for the future.

• FWP initiated a menroring program that will help employees achieve their career objectives.

• In 1998 FWP began laying the groundwork for a performance management system that will be the basis for employee recruitment and selection as well as training and development.

New DEER MANAGEMENT Program Instituted

The establishment of hunting regulations is but one aspect of a deer management program. In 1998, FWP initiated a process to incorporate what are termed Adaptive Harvest Management concepts into the hunting regulation-setting process. The goal is to manage for the long-term welfare of Montana's deer resource and provide recreational opportunities that reflect the dynamic nature of deer populations.

MILO BURCHAM

Adaptive Harvest Management is based on the following four components: 1) clearly defined population objectives; 2) a monitoring program that measures population status in relation to the objectives; 3) hunting season packages that can be implemented when the monitoring program detects a change in the population status; and 4) a description or model(s) of deer population dynamics that can be used to predict how the population will respond to changes in harvest levels.

To date, FWP has established the objectives and regulation packages, implemented the monitoring program, and developed the first generation of population models for testing. Hunting regulations will be recommended annually by FWP to the FWP Commission based upon the population's current status in relation to the objectives. The season type and bag limit recommended for each population status is based on the harvest rate desired, the preferences and concerns of sportsmen and landowners, deer summit meerings, and comments received during previous season-setting processes.

One of the benefits of Adaptive Harvest Management is learning from experience. As information is gathered through the monitoring program, there will likely be a need to adjust population parameters, monitoring locations, and guidelines. In addition, adjustments in hunring seasons will probably be necessary as we learn more about the results of the various hunting season srrategies.

... maintaining and enhancing the health of Montana's natural resources

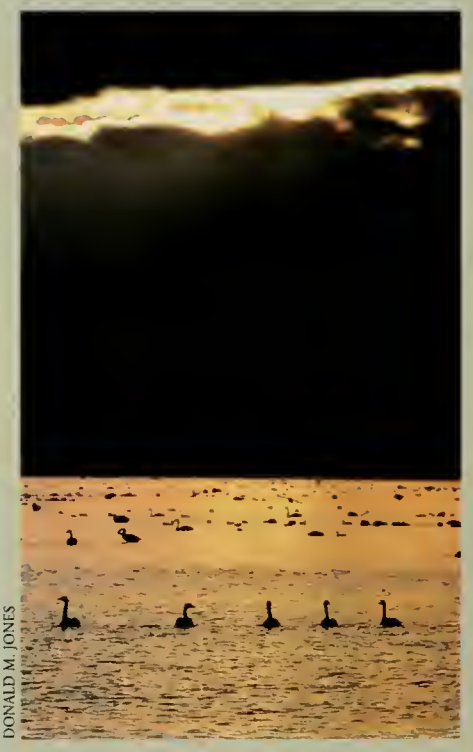
• In 1998, FWP completed three planning documents—an *Environmental Impact Statement for FWP's Wildlife Program*, *"Fisheries Beyond 2000"* and *"2020 Vision for Montana State Parks."* These documents reflect the agency's current vision and goals, explain what we've heard from our publics, and detail those challenges, as well as opportunities, that we will need to consider in the future.

• Conservation easements continue to be FWP's principal tool for protecting valuable wildlife habitats through the Habitat Montana Program. In 1998, conservation easements were used to protect wildlife habitat on 28,536 acres of land. Over the last five years, the wildlife values of over 145,500 acres have been protected by conservation easements.

• In response to continuing lower numbers of both mule deer and white-tailed deer in certain parts of Montana, deer hunting regulations in 1998 continued to be more restrictive than in the years prior to 1997. While the restrictions primarily affected mule deer hunting (with an area validation requirement in place for hunting mule deer bucks throughout the state), regulations for hunting white-tailed deer in certain areas of Montana also were more conservative. The goal of these changes was to significantly decrease overall harvest of deer so that populations can increase when environmental conditions promote better fawn survival.

• The Montana Bull Trout Restoration Team completed a draft Restoration Plan for Bull Trout, and is seeking public comment on it before finalizing it in early 1999. Despite Montana's ongoing restoration efforts, bull trout throughout the Columbia River Basin were listed as threatened under the Endangered Species Act in July 1998. However, it is expected that Montana's Bull Trout Restoration Plan will serve as the basis for the Montana portion of a federal recovery plan, and that these planning efforts will be beneficial to Montana.

• Lack of huckleberries in the mountains and continued residential development in the valleys resulted in unprecedented levels of bear/human conflicts in western Montana. Bear management specialists and game wardens handled hundreds of black bears and grizzly bears which frequented residences. Managers worked extensively with landowners to reduce bear conflicts and employed innovative techniques such as aversive conditioning with Karelian bear dogs, and rubber bullets and cracker shells to haze bears and reduce conflicts at residences.


DONALD M. JONES

• The water management system at Freezout Lake Wildlife Management Area was completed at a cost of $435,000. The system replaced and repaired the WMA's water control structures, some of which dated back to the 1950s. The new control structures—culverts, underground pipes, and water diversions—will allow FWP to better manage water flows and water quality.

• A comprehensive assessment of the status of the Yellowstone cutthroat trout in Montana waters was completed by FWP in concert with fisheries personnel from the U.S. Forest Service and the U.S. Fish and Wildlife Service. The goal of the assessment is to provide baseline information for formulation of a conservation plan for Yellowstone cutthroat trout in the state.

• FWP's TIP-MONT program continues to gain popularity among all those who value Montana's rich fish, wildlife, and parks resources. In 1997, the latest year for which complete figures are available, nearly 800 reports of violations led to the imposition of $37,355 in fines, $10,350 in restitution, and $9,750 in rewards to persons reporting crimes. The violators' hunting, fishing, and trapping privileges were suspended for a total of 60 years.

Montana Fish, Wildlife & Parks

MISSION—

Montana Fish, Wildlife & Parks, through its employees and citizen commission, provides for the stewardship of the fish, wildlife, parks and recreational resources of Montana, while contributing to the quality of life for present and future generations.

DEPARTMENT GOALS—

• Create a work environment where priorities are clear; the decision-making process is efficient and effective; and, where employees feel a sense of accountability, value and satisfaction in their achievements and their contributions to the agency mission.

• Provide quality opportunities for public appreciation and enjoyment of fish, wildlife and parks resources.

• Maintain and enhance the health of Montana's natural environment and the vitality of our fish, wildlife, cultural and historic resources through the 21st Century.

• Emphasize education, communication and responsible behavior to afford citizens the opportunity to better understand and participate in the decision-making processes that sustain our natural, recreational and cultural resources for future generations.

MONTANA FISH, WILDLIFE & PARKS
COMMISSION—

STAN MEYER, *Chairman*, Great Falls

DAVID W. SIMPSON, *Vice Chairman*, Hardin

DARLYNE DASCHER, Fort Peck

CHARLES R. DECKER, Libby

TIM MULLIGAN, Whitehall

Visit our website at fwp.state.mt.us

• In December, Montana's Hunter Behavior Advisory Council submitted its recommendations to FWP. The recommendations are rooted in an understanding that hunters, resource managers, outfitters and guides, and landowners are together responsible for attending to Montana's social and natural hunting environments. Some recommendations, like those associated with expanding Montana's hunter education program to include adult programs and offerings, will need legislative attention.

• The Hunter Education Program's mobile simulated shooting center was used extensively to reach more than 50,000 Montanans with a safe and enjoyable shooting experience. Participants learned gun safety and proper shot placement on big game and other animals, as well as hunter ethics, as they took part in this activity.

• During 1998, angler education instructional opportunities were provided to 558 educators who will reach nearly 14,000 Montana students.

• The success of FWP's involvement with the nationally acclaimed *Hooked on Fishing, Not On Drugs* program in Montana schools is evidenced by the fact that the program has now expanded to include nearly 60 schools and over 1,000 students.

• In cooperation with the Governor's Bull Trout Recovery Team, FWP produced a video for use in schools to help call attention to some of the problems facing the species in Montana.

• FWP's video unit produced a made-for-television 30-minute special entitled "Wild Montana." Governor Marc Racicot hosted the production, which aired on all four Montana Television Network stations in June, July, and August.

• Two public service announcements on the importance of hunter ethics were produced in cooperation with the Montana Wool Growers Association and the Montana Bowhunters Association. The public service announcements were aired on all television stations in Montana during the fall hunting season. FWP's video unit, in cooperation with Montana's game wardens, also produced a 10-minute video on hunter ethics as part of a larger statewide effort to highlight the importance of promoting acceptable hunter behavior.

...emphasizing education and responsible behavior

MIKE BARLOW

where the money comes from

budgeted, fiscal year *REVENUES* 1999

•FWP IS FUNDED PRIMARILY BY USER FEES.
•LESS THAN 1% OF FWP'S TOTAL BUDGET COMES FROM THE STATE GENERAL FUND.

HUNTING AND FISHING LICENSES

This includes all license sales revenue, interest earnings, and other miscellaneous revenue.
Non-resident sales account for nearly two-thirds of FWP's total license revenue.

68.8 %
$35,335,160

FEDERAL REVENUES

FWP receives federal monies to: aid in fish and wildlife restoration efforts; for parks development and maintenance; for boating safety, education, and regulation; and other programs. In FY99 close to 90% of FWP's federal assistance, or approximately $10 million, was apportioned to Montana for fish and wildlife restoration through the Pittman-Robertson (P-R) and Wallop-Breaux (W-B) programs. P-R monies are derived from an excise tax on sporting arms and ammunition, hand guns, and certain archery equipment. W-B monies are derived from an excise tax on fishing equipment and electric trolling motors, a portion of the federal fuels tax, and import duties on fishing tackle and pleasure boats. The balance of the federal monies comes from various federal sources and is used for other purposes, including parks projects.

19.6 %
$10,090,453

OTHER STATE REVENUES

Other state revenue sources include: fees for state park use; a portion of the state's lodging facilities use tax; a small percentage of the state fuel tax; interest earnings from coal severance tax receipts; and other miscellaneous revenue sources.

10.8 %
$5,529,971

GENERAL FUND

State tax dollars.

0.8 %
$412,520

TOTAL REVENUES: $51,368,104

where the money goes

budgeted, fiscal year *EXPENDITURES* 1999

FWP SPENDS ITS MONEY TWO WAYS:
- OPERATIONS for day-to-day management of fish, wildlife, and parks resources.
- CAPITAL for major repair and maintenance of FWP properties, for renovation and construction of facilities, and to protect and enhance critical habitats.

parks:

operating	$4,943,969
capital	$1,803,750
total	$6,747,719
% of total	13.1

The Parks Division is responsible for development, maintenance, and operation of all state parks and affiliated sites with an objective of providing diverse recreational opportunities while preserving important historical and cultural resources within Montana.

wildlife:

operating	$6,790,923
capital	$3,810,000
total	$10,600,923
% of total	20.6

The Wildlife Division is responsible for managing all species of big game, upland game birds, waterfowl, furbearers, non-game birds, and endangered wildlife in the state.

fisheries:

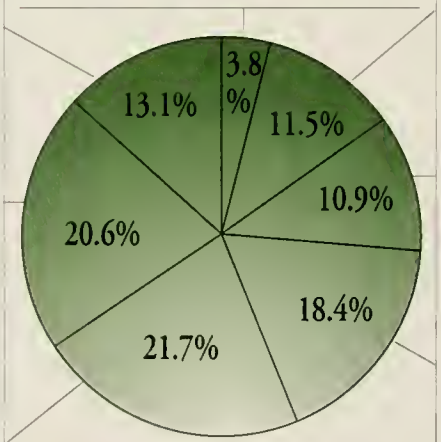
operating	$6,436,470
capital	$4,708,309
total	$11,144,779
% of total	21.7

The Fisheries Division is responsible for the management and perpetuation of Montana's fish and other aquatic resources.

conservation education:

operating	$1,930,258
% of total	3.8

The Conservation Education Division acts as a clearinghouse for disseminating information on FWP activities and news items to the media and conducts a variety of educational and recreation-safety programs.



FWP total:

operating	$40,702,545
capital	$10,665,559
total	$51,368,104

enforcement:

operating	$5,890,351
% of total	11.5

The Enforcement Division is responsible for enforcing all the fish and game laws of Montana, FWP rules, and FWP Commission regulations. Division personnel also enforce state boating and snowmobile rules and state park regulations, as well as private property laws and regulations as they pertain to hunting and fishing.

field services:

operating	$5,597,605
% of total	10.9

The Field Services Division is responsible for FWP's lands program and construction projects, as well as its Block Management (public hunting access) and landowner-sportsperson's relations programs.

management & finance:

operating	$9,112,970
capital	$ 343,500
total	$9,456,470
% of total	18.4

The Helena-based director's office staff makes major policy and administrative decisions. Regional supervisors handle on-the-ground implementation of policies and programs. The Administration and Finance Division is responsible for budgeting, accounting, purchasing, personnel, data processing, and administration of FWP's licensing functions.

Sunspots © Guy Coheleach. Courtesy of the artist and art print publisher Mill Pond Press, Inc., Venice, FL 34292. For additional information call 800-535-0331.

The Colors of SURVIVAL

by SAM CURTIS

You get some fascinating perspectives on nature by reading stories to kids. Rudyard Kipling's *Just So Stories*, for example, have some pretty farfetched angles on how certain animals have developed their unique characteristics, like the elephant's trunk. Surprisingly, the story "How the Leopard Got His Spots" contains more fact than fiction regarding how some animals end up colored the way they are:

In the days when everybody started fair...the Leopard lived in a place called the High Veldt...where there was sand and sandy-coloured rocks and 'sclusively tufts of sandy yellowish grass. The Giraffe and the Zebra...lived there; and they were 'sclusively sandy-yellow brownish all over; but the Leopard, he was the 'sclusivest sandiest-yellowish-brownest of them all...and he matched the colour of the High Veldt to one hair. This was very bad for the Giraffe and the Zebra... for he would lie down by a 'sclusively yellowish-brownish stone or clump of grass, and when the Giraffe or the Zebra...came by he would surprise them out of their jumpsome lives. After a long time [the Giraffe and the Zebra] went away from the High Veldt. They scuttled for days and days and days till they came to a great forest, 'sclusively full of trees

and bushes and stripy, speckly, patchy-blatchy shadows, and they hid: and after a long time, what with standing half in the shade and half out of it, and what with the slippery slidy shadows of the trees falling on them, the Giraffe grew blotchy and the Zebra grew stripy...and so, though you could hear them and smell them, you could very seldom see them, and then only when you knew precisely where to look.

Well, since the leopard couldn't see his "breakfast," he went hungry. And when he tried to hunt the giraffe and the zebra in the great forest, his yellowish-brownish coat stuck out "like a bar of soap in a coal-scuttle." Only when the leopard got black spots from the fingertips of the Ethiopian hunter he traveled with could the leopard "lie out on a leafy branch and look like sunshine sifting through the leaves."

"How the Leopard Got His Spots" is an entertaining short-course in protective coloration and how it has evolved in many animals, reptiles, insects, and birds as a means of survival in the eat-and-be-eaten hierarchy of the food chain.

Protective coloration takes a number of fascinating forms. Animals that taste good to predators, for example, are often camouflaged to look like the vegetation, soil, and rocks where they live. They are colored not to be seen in order to avoid being eaten.

Animals that stand out from their surroundings, on the other hand, often taste awful to predators. They advertise that fact with their warning colors. So, they are colored to be seen in order to avoid being eaten.

There are also critters that taste good but look like they taste bad. They have *mimetic* coloration that makes them look like yucky-tasting beasts even though they are not. And there are even animals that have diverting coloration that diverts a predator's attack from vital to nonvital parts of their bodies.

Protective coloration is a phenomenon we usually think of as helping animals that are preyed upon. But, in the interest of fairness, as Kipling suggests, nature has endowed many predators with blend-in qualities, too. Consider the leopard and his spots.

In Kipling's story, however, we'll learn more about the evolution of protective coloration by looking at how the giraffe got blotchy and the zebra got stripy. It took a "long time" in the story. It takes a lot longer in nature, and it involves a process called natural selection.

Ironically, it is the predators themselves that are responsible for their prey's camouflage colors. You see, predators are easily able to catch and eat tasty prey species whose camouflage is not very effective. The species that survive to reproduce in greatest numbers are those whose colors happen to blend in best with their surroundings. Then, their "blend-in" genes are passed on to their offspring, and after many generations of this hand-me-down natural selection process, the well-camouflaged, good-tasting species far outnumber the good-tasting, ill-camouflaged species. As a result, everybody starts fair, as Kipling put it, in the contest between predator and prey.

CAMOUFLAGE

Most animals that blend in with their surroundings have some common color patterns. Almost all mammals, for

JOHN G OBREY

TOM J ULRICH

Above: *The praying mantis relies on its similarity to a leaf or stem to deceive insect-seeking birds.* **Right:** *White-tailed ptarmigan turn white in winter to match their snowy environment, then revert to mottled black and brown the rest of the year.* **Opposite page:** *The moth in the top photo provides a good example of disruptive coloration—its dark and light blotches and contrasting bands of color blend perfectly with the mottled bark of the tree. In the lower photo, a barely discernible American bittern thrusts its head and neck skyward to resemble a cattail or rush.*

TOM J. ULRICH

DONALD M. JONES

example, are darker in color on their backs and lighter on their stomachs. Since the sun shining from above lightens their dark backs but darkens their light stomachs in shadows, this color pattern—called countershading—helps the animals merge with the backdrops of their habitats.

Fish display similar countershading. Their dark backs, looked down upon from above by predatory herons, hawks, and eagles, blend in with the color of plants, rocks, and deep water in rivers and lakes. But their silver stomachs, looked at from below by other predatory fish, keep their silhouettes from becoming too obvious against the light from above.

Of course, countershading can get an animal into trouble in a place like Montana where the world turns white for half the year. That's why some critters turn color with the seasons. The mottled black and brown of the ptarmigan offers effective camouflage among the rocks and twigs of the high country during summer. But in winter the bird's feathers turn pure white.

Some weasels and hares have similar color changes to help them blend with the seasons. But occasionally a snowless autumn throws a glitch in the system, and you may see a white weasel or a white hare sticking out against the dark ground "like a bar of soap in a coal scuttle," as Kipling says.

Disruptive coloration is another kind of concealing color pattern common to camouflaged animals. In Kipling's story, the blotches on the giraffe and

the stripes on the zebra serve to break up the shape of these animals against the backdrop of their habitat. The dark and light patterns on a frog have the same dappled effect among green plants and rippled water. And try spotting a ruffed grouse standing motionless against a background of dead leaves. Similarly, the bands of contrasting color on a killdeer break up its outline as it sits on its eggs among stones of different colors.

The fawns of both mule deer and white-tailed deer are especially vulnerable to predation by coyotes, mountain lions, and bears. But the fawns' white spots, which they lose as they grow older, give their coats a dappled appearance; much like sunlight shining through the leaves of trees.

When faced with danger, a fawn presses itself flat against the ground to further conceal its silhouette. In fact, many animals display behavior patterns appropriate to their color scheme. If you've got camouflage colors, you'll blend in better if you stay still.

Some insects become masters of deception by having the right color and shape and by choosing exactly the right place to remain motionless. The green wings and legs of a praying mantis, for example, look like just so many more leaves and stems on the bush it selects to rest upon. The wings of some insects even have veins to match the veins in the leaves they climb on to eat. And sometimes their resemblance to a leaf includes random brown or black wing markings that look like scars left on a leaf by insect bites.

Insects of the walking stick family are brown and slender and resemble twigs when they perch at an angle to a branch of the bush they feed upon. The bumps and nicks on a walking stick's body resemble the buds and scars on the bush's bark. When touched, a walking stick falls motionless to the ground where it looks like just another broken twig among the forest litter.

WARNING COLORS

A variety of animals use a more colorful approach to survival. Covered with bright colors and flashy with movement, they strut their stuff in the face of their predators in an attempt to warn them away.

MICHAEL S. QUINTON

The skunk's unmistakable black and white stripes warn would-be predators to stay away.

As Denis Owen writes in his book, *Camouflage and Mimicry* :

> [These animals] are noxious, even toxic to predators. They taste or smell foul, sting, bite, irritate, produce unpleasant secretion or mucus, and may cause sickness if eaten. Predators tend to avoid them. The warning coloration advertises their unpleasantness and predators become conditioned to leaving them alone.

Though humans stand high in the food chain, we certainly have been conditioned to avoid wasps and bumblebees with their bold black and yellow stripes designed to remind us of the pain they inflict by their sting. The bright red ladybug with its contrasting black spots warns of the skin rash it is capable of causing by secreting, from the joints in its legs, an alkaloid called *coccinellin*. Some caterpillars say "beware" with brightly colored hairs that can sting and redden your skin. And in the mammal world, the North American skunk announces in black and white its potential for making a big stink.

Just as we have learned to stay away from certain warningly colored beasts, birds have been conditioned to avoid eating the bright orange and black monarch butterfly. Caterpillars of this species feed on milkweed, which contains poisons called *cardenolides*. The poisons are carried through the pupal stage into the adult butterfly.

A blue jay that isn't clued into the monarch's warning colors may eat one of them, but then it's likely to vomit. One monarch is dead, but many more will live because that jay won't go near another monarch as long as its memory lasts.

MIMICKING COLORS

It's no wonder that jays and other birds also avoid eating the viceroy butterfly, a species that has colors and markings that mimic the monarch. The viceroy is quite palatable to predators, but its mimetic coloration makes predators associate this butterfly with the monarch, so they avoid it. Mimetic coloration is most commonly seen in insects, but it appears in reptiles and amphibians, too.

The bad reputation of the yellow and black North American wasp protects many harmless beetles, moths, and flies that have the same markings. Certain hoverflies look and act like honeybees as they land on flowers to gather nectar. Hoverflies would taste quite good to birds and toads if these predators tried eating them. But one bad experience is

enough to make a predator swear off look-alike hoverflies for a long time.

Ants, also, have gained a bad reputation for stinging, biting, and releasing secretions that are unpleasant to the nose and mouth of a would-be predator. So, there are lots of other insects and spiders that look and move like ants. To hide the fact that it has four pairs of legs instead of three pairs, like ants, one mimicking species of spider points its front legs forward so they look like an ant's antennae.

"Mimetic associations have taken thousands, maybe tens or hundreds of thousands of years to evolve," says Denis Owen. "Presumably, the distasteful models and their warning coloration evolved before the mimics and subsequently the mimics gradually developed the appearance of noxious species. Likely there were slight changes which gave small advantages to the mimic and as time passed these were improved upon by natural selection."

DIVERTING COLORS

Another color scheme for survival involves colors and patterns that divert a predator's attack away from vital body parts. Numerous birds, bugs, snakes, lizards, and butterflies display diverting color patterns that often allow them to survive a predator's attack with only minor damage.

Eyespots—color patterns that resemble eyes—have been naturally selected as effective diversions and often appear near the edges of butterflies' wings. Since the head is a vulnerable part of an animal's body, and since eyes target the center of that vulnerability, a bird may peck at a butterfly's eyespots only to end up with a shred of wing while the rest of the butterfly gets away. So, when you see a V-shaped piece missing from the edge of a butterfly's wing, you can take it as evidence of a near-miss and of the effectiveness of diverting coloration.

One family of butterfly has hindwings with tips shaped like antennae and markings that are similar to its head. When the butterfly lands, it wiggles its hindwing tips and keeps its real antennae still, so predators mistake its rear-end for its head-end, and the butterfly has a chance of escaping with only minor damage to nonvital body parts.

Some snakes use a similar ploy, with tails colored brightly to attract attention. One nonpoisonous species even raises its tail when frightened but keeps its head still. If a predatory bird isn't frightened away by this striking pose, at least its likely to peck at the snake's tail instead of its more vulnerable head.

Colors designed to frighten predators are often concealed behind the camouflage colors of some animals; the bright colors are suddenly revealed if the animal becomes alarmed. For example, there are some moths whose drab forewings help them blend in with the bark of the trees on which they rest. If a predator gets too close for comfort, however, they'll suddenly expose their hindwings featuring bright orange-yellow spots circled in black. To a predatory bird, these startling eyespots may look like the eyes of an animal that likes to eat birds!

Clearly, there are many forms of protective coloration, and there may be other cryptic color schemes that our eyes will never understand. We need to remember that animals see in different ways, and those easily seen by us may have camouflage colors in the eyes of other predators or prey.

In Kipling's story, "How the Leopard Got His Spots," we may not think the leopard's tawny coat—even with the addition of black spots—blends in very well with the background green of the "great forest." But in the eyes of ungulates like Giraffe and Zebra, animals who see not in color but in black and white, Leopard's disruptive spots make him blend with the scenery quite dangerously. ■

TOM J. ULRICH

LEFT: *By looking like something that tastes bad—in this case, a bumblebee—the sphinx moth escapes birds that would otherwise find it a tasty meal.* **BELOW:** *The pygmy owl's two glowering yellow eyes—and two dark "false eyes" on the back of its head—make it appear more formidable to potential predators.*

DONALD M. JONES

DONALD M. JONES

Saving the Pallid Sturgeon:

NEW HOPE FOR AN OLD

FISH

by BRUCE AUCHLY

BILL GARDNER

JIM LIEBELT

LET'S BE REALISTIC. Until last year, the future of the pallid sturgeon in the Missouri and Yellowstone rivers looked dim, lackluster, kind of, well, pallid. There were too few adult fish to spawn regularly and reservoirs swallowed up any young that did hatch.

Last August, state and federal fisheries officials stocked 1,500 one-year-old pallids in the two rivers. There are still not enough adult pallids and no evidence of spawning, but the clouds of extinction have lifted a little.

In the Missouri, there are perhaps 50 adult pallid sturgeon swimming in the 150-mile stretch of the river between the mouth of the Marias River near Fort Benton and the head of Fort Peck Reservoir downstream from the Fred Robinson Bridge. That does not bode well for a self-sustaining population, explains Bill Gardner, Montana Fish, Wildlife & Parks (FWP) fisheries biologist in Lewistown. "Let's say of those 50 fish, 25 are males. Males spawn every year. Then there are 25 females. Females spawn every three years. That means there are about 8 females and 25 males available to spawn in any year."

North Dakota Game and Fish director Dean Hildebrand (left) and FWP Fisheries Division administrator Larry Peterman release a pallid sturgeon used for brood stock back into the Missouri River.

FRED RYCKMAN

One hundred fifty miles of river represents an awfully big stretch for those few fish to find each other and get amorous. "That's part of the problem," says Gardner. "They have too many years when they don't reproduce successfully."

Fort Peck Reservoir is another part of the problem. "Fort Peck has a bad bottom for pallid sturgeon," Gardner says. For newly hatched pallids, a reservoir is a death sentence; they sink in the mud and suffocate.

Biologists estimate there are 250 pallids in the Missouri below Fort Peck— in the 240-mile stretch to the headwaters of Lake Sakakawea in North Dakota—and the lower 70 miles of the Yellowstone River. The numbers seem to indicate that ecosystem represents the endangered species' last best chance at a self-sustaining population in Montana. But the numbers are deceiving. No pallid spawning has been found, and the culprit again may be a reservoir: Lake Sakakawea. "That's what we think," says Jim Liebelt, FWP fisheries biologist in Fort Peck. "We've found no concrete evidence of spawning. No yearling has ever been recovered."

Last year, Montana, North Dakota, and federal fisheries biologists released 750 one-year-old pallids at three spots in the upper Missouri. The fish were raised in a federal fish hatchery at Gavins Point, South Dakota. Another 750 pallids were set free in the Missouri near the Montana-North Dakota state line and in the lower Yellowstone. This year, a mixture of one- and two-year-olds will be planted, though fewer fish overall than in 1998.

Ideally, stocking will build up the pallid population in the two areas, while preserving and maintaining the gene pool. Just don't expect quick results. Female pallids take up to 15 years to reach sexual maturity. That means no one will have any idea if these dinosaurs are reproducing successfully until the year 2013. Gentlemen, start your calendars.

DINOSAURS. Much has been written about the pallid sturgeon's connection with the dinosaurs. While *Tyrannosaurus rex* strutted about nearly 200 million years ago in what is now Montana, pallids swam nearby. Just a thought, but *T. rex* is extremely fashionable nowadays, and it's been dead and gone for 50 million years or more. Imagine the popularity of the toothy meat eaters if there were 50 still lumbering around eastern Montana. Meanwhile, the homely pallid still swims near the bottom of a muddy river. Few people ever see them and fewer care.

Anyway, today's popular game fish are evolutionary babies by comparison.

The oldest known trout fossil dates back 50 million years. Biologists guess the salmonid family began about 100 million years ago.

For a couple of hundred million years, the pallid and its cousin, the shovelnose sturgeon, didn't change and were able to cope with evolution around them. However, man's modifications to North America's rivers—dams and channelization—came too fast for the primitive pallid to adjust. Oddly, the shovelnose in the same waters is doing just fine, thank you. No one is sure why, though theories abound.

Shovelnose may still be prospering because their young behave differently than those of pallids. When shovelnose spawn, the eggs take a week to 10 days to develop into larval fry, which look like a couple of inches of sewing thread with two pinheads for eyes. After hatching, the larvae break free of the bottom and begin to drift downstream until they settle again on the river bottom, and therein, apparently, lies the difference between the successful shovelnose and the unsuccessful pallid: shovelnose larvae drift for about a week, pallid larvae drift for 10 to 15 days. On the upper Missouri, a drift of nearly two weeks puts those larvae into Fort Peck Reservoir, where they sink and die.

"The fish that do well in Fort Peck are mid or surface feeders," Gardner says. "Young paddlefish probably say, 'Yippee, we're in heaven.' Young pallids probably sink to the bottom and say, 'Yuck, what is this muck?' "

The same occurs below Fort Peck Dam. The Missouri coming out of Fort Peck is too cold, about 50 degrees, leaving nearly 50 miles downstream of the dam inhospitable to pallid reproduction. The Yellowstone is warm enough and has no dams or reservoirs, and biologists have identified at least one possible spawning area on the lower Yellowstone. But because this site is only 50 miles upstream from the head of Sakakawea, it may produce young pallids only to have them drift downstream and smother in the North Dakota reservoir.

AS A SPECIES, the pallid sturgeon probably began its inexorable march toward extinction in the upper Missouri with commercial fishing 100 years ago. They were once common in the Missouri, Mississippi, Yellowstone, Platte, Kansas, Ohio, Arkansas, Red, Sunflower, and Atchafalaya rivers from Montana to the Gulf of Mexico. Outside of Montana, the only rivers pallids are slightly more common in today are parts of the Mississippi and the Atchafalaya. The pallid sturgeon was declared a federally endangered species in 1990.

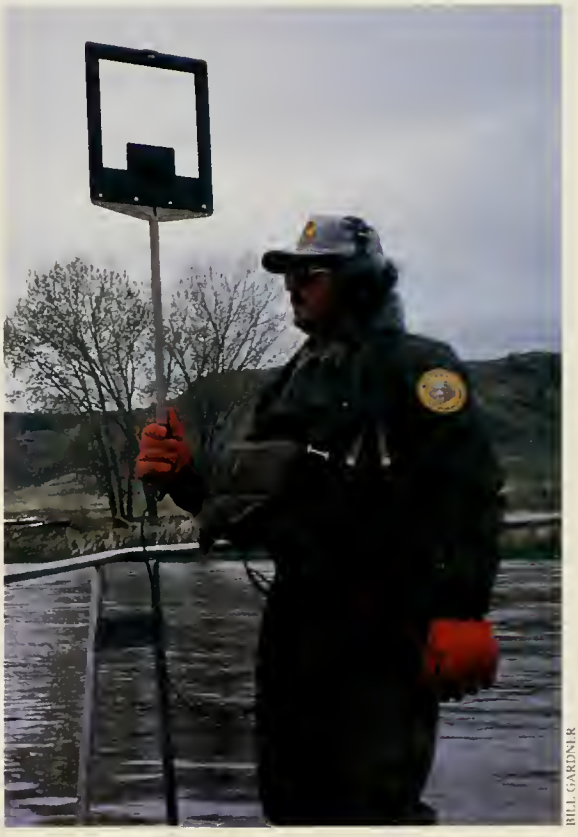
In Montana, the construction of Fort Peck Dam in the mid-1930s seems to have finally pushed the fish down the slope toward oblivion. A federal roster of pallid sightings has 500 listed in the 1960s, 209 in the '70s, and only 56 in the '80s.

Because North Dakota's Lake Sakakawea was created 20 years later, in the late 1950s, biologists fear that reservoir merely reflects Fort Peck of the 1970s. Current estimates count the pallid population at 250 in the Missouri upstream of Lake Sakakawea. "We had 20 more years to degenerate," Gardner says, comparing Fort Peck to Lake Sakakawea. "Their time is coming."

Pallid sturgeons live a long time, perhaps up to 60 years. So it's conceiv-

BILL GARDNER

About 100 of the hatchery-raised pallid sturgeon stocked in the Missouri and Yellowstone rivers last summer were fitted with tiny radio transmitters, providing valuable data on movements of yearling fish. Radio-tracking showed that fish released farther upriver where the gradient is steeper traveled the longest distances downstream.



BILL GARDNER

JIM LIEBELT

FWP research biologist Jim Liebelt holds one of several mature pallid sturgeon that have been captured and released in an effort to learn more about the species' biology in the Missouri and Yellowstone rivers.

able the sightings in the 1980s could have been fish alive when Fort Peck was built. But Gardner believes most of the 50 or so adult fish now in the river hatched after the reservoir filled. "It's hard for me to believe that all those fish out there are 62 years old," he says.

Certainly that's the case with the smallest fish Gardner and his fisheries crew has found: a 21-pounder, probably 20 to 25 years old. Liebelt's team has captured a 19-pound pallid on the lower Yellowstone and a 15-pounder in the Missouri. It's uncertain how old those fish are because determining the age of pallids is difficult.

Most fish are aged by looking at their scales under a microscope. Each year, the fish adds a ring to its scales, like a tree. Unfortunately, sturgeon don't have scales; they have "skutes," or bony plates. Skutes are the sign of an evolutionary geriatric, evolving about 500 million years ago. Fish scales are much, much younger. "To age pallids," Gardner explains, "you take a piece of the pectoral fin, do a cross section on that just like you would a deer tooth, and count the rings."

Yet, taking a piece of the fin does not always yield a born-on date. The older the fish, the more compact the rings, making accuracy questionable, says Liebelt. "Even on shovelnose, they have done a lot of aging, and it's not really accurate once you get past 15 to 20 years."

The idea, of course, is to find out when the fish spawned. Pallids younger than 62 indicate reproduction took place sometime since Fort Peck filled, possibly during the high flow years of 1964 or 1975. "I think they spawned in 1975," Gardner says. By discovering when pallids spawned successfully, he feels it may be possible to duplicate those conditions using a dam to release or withhold water.

Faced with few definite answers, declining pallid populations, and no evidence of young fish, biologists decided to track the hatchery-raised pallids stocked last summer. Of the 750 stocked in the upper river last year, 45 fish had radio transmitters implanted. Of these, says Gardner, 22 provided good tracking data. Below Fort Peck, Liebelt's crew followed 24 transmitting pallids on the Missouri and 25 on the Yellowstone. The radios beeped data for three months before the batteries wore out.

Gardner found fish released at the Robinson Bridge didn't drift very far, 5 or 6 miles. Pallids stocked at the mouth of the Judith River drifted downstream a few more miles. But yearling sturgeon released near the mouth of the Marias drifted the farthest, some almost 150 miles to the Robinson Bridge. "And these are yearling fish. They're not helpless like larval fry," Gardner says.

Gardner concludes that the steeper the river gradient, the more the fish have a tendency to drift. "The more the fish drift the more I'm convinced it's not a good thing," he says. "If they drifted 150 miles in three months they have to be looking for better habitat."

Liebelt's pallids stayed put by comparison, moving no more than 6.5 miles upstream and about 4 miles downstream from the release site on the Missouri. On the Yellowstone, the fish didn't move more than 11 miles downstream and 8 miles upstream. Measurements taken at the release sites indicate pallids select areas associated with sandy bottoms in 5 to 6 feet of water where the current flows about 2.3 feet per second.

THIS YEAR WILL BE a repeat of 1998 with a few important twists. First, two-year-old pallids will be stocked along with one-year-olds. Second, Gardner will stock pallids near Coal Banks Landing, not at the mouth of the Marias. The river at Coal Banks is not as steep as at the Marias. Also, some of the radio-implanted fish will not start sending out signals until the spring of 2000. "We want to see what happens to the fish over the winter," Gardner says. "I'll also be comparing the survival differences between yearlings and two-year-olds."

In addition to his regular stocking, Liebelt plans on placing about 140 two-year-olds in the lower Milk River to look at that tributary's role in pallid sturgeon survival.

For the long term, the key will be learning what event in the past caused pallids to reproduce. Was it the high water years of 1964 and 1975?

If only a few dozen were in the river to spawn in 1975, that would explain why the fisheries crews have found so few younger fish. The conditions were right but there were too few fish to have much of an impact. "With stocking," Gardner says, "the idea is to increase the number of fish so the next time a spawning event occurs there will be more pallids available to spawn."

Stocking also may help establish a pallid population farther upstream where they can spawn and have a longer time to drift and develop primary fins before reaching the unsuitable lake conditions of Fort Peck. "If the fry are developed enough to maintain their position in river habitat above the Fort Peck delta," Gardner says, "they will find suitable nursery areas. If they drift past the delta into the reservoir, they're dead meat."

By man's hand the fish plummeted; by man's hand maybe it will recover. ■

First place—Cliff Rossberg

Rossberg Wins

1999 Migratory Bird Stamp Contest

by William Phippen

Cliff Rossberg's colorful rendition of a pair of Barrow's goldeneye ducks in flight has been selected for reproduction as Montana's 1999 Migratory Bird Stamp.

The Great Falls artist's painting was selected from among 13 other entries by a team of five judges late last fall. Placing second, third, and fourth, respectively, were paintings by Darrell Davis

Second place—Darrell Davis

Third place—Joe Thornburgh

of Helena, Joe Thornbrugh of Hamilton, and Robert Kercher of Great Falls. Thornbrugh has won the competition five times, while Davis has won it once.

As has been the case since its inception in 1986, the competition was open only to Montana residents and all entrants had to confine their works to a central theme—for 1999, a pair of Barrow's goldeneyes on a western Montana river. All of the entries were unsigned and entrants were not identified until all ballots had been tabulated.

It is the eighth time Rossberg has submitted a painting to Montana's annual stamp competition. He had never won the competition, although he has placed third twice. A part-time pharmacist with a love for the outdoors and its wild denizens, Rossberg, 26, won the Delaware Trout Stamp contest in 1998.

"It certainly means of lot," says Rossberg of his win in Montana's 1999 stamp competition, "and it was one of my major goals as a wildlife artist. It's very exciting because winning a state duck stamp contest can catapult a wildlife artist onto a higher plane among his or her peers."

"I personally love the challenge of capturing the colors, angles, and environmental moods that you face when trying to accurately depict waterfowl and their habitats," he continues. "I also believe the duck stamp program is one of the finest examples of how people from all walks of life can contribute to wildlife conservation. And as an artist, it's a wonderful way for me personally to contribute to the effort."

Beginning in 1986, hunters have been required to possess a state Migratory Bird Stamp (the name was changed from "waterfowl" to "migratory bird" a couple

of years ago to more accurately reflect the species that hunters with stamps can pursue) in addition to a federal "duck stamp" to hunt waterfowl and other migratory birds in Montana. The 1985 Legislature established the stamp and authorized Montana Fish, Wildlife & Parks to sell the stamp and market related items. In 1997, the latest year for which a complete tally is available, stamps were sold to 24,064 migratory bird hunters in Montana and approximately 3,000 stamp collectors across the U.S. and in several other countries. Funds garnered from the sale of the $5 stamps and related artwork are used solely to enhance and develop Montana wetlands for the long-term benefit of waterfowl and other wildlife species.

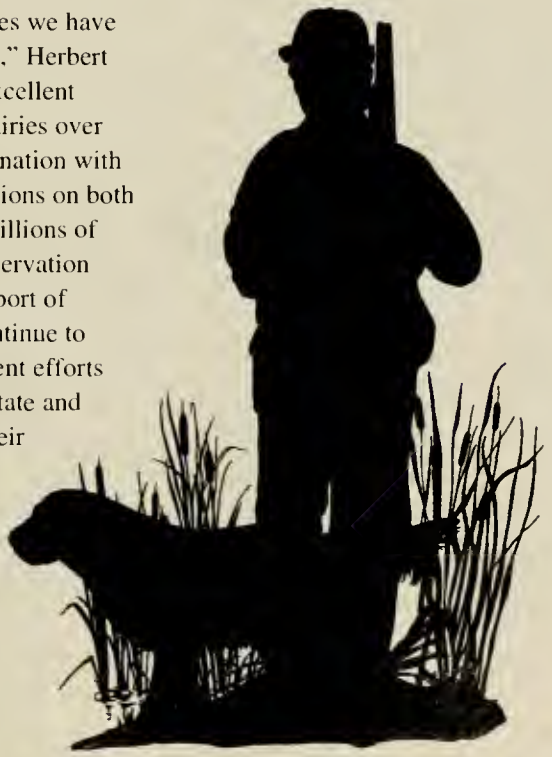
Jeff Herbert, state waterfowl coordinator for FWP in Helena, says the stamp program continues to focus on efforts to improve waterfowl production potential of both wetlands and associated upland habitats. Emphasis is being placed on small wetland development and restoration, dike repairs, and upland vegetation management. Larger projects, he explains, often are cost-shared with Ducks Unlimited.

"These efforts benefit not only our migratory bird resources," Herbert notes, "but a wide range of other wildlife species as well. The cooperative nature of these projects is critical to the success of these habitat enhancement efforts. The involvement of private landowners, federal agencies, and private conservation organizations make it all happen."

Those efforts have produced gratifying results. Surveys of Montana's duck breeding grounds conducted last May turned up 1.4 million ducks, down slightly from a record high of 1.9 million in 1997. The 1998 estimate included 550,000 breeding mallards, which was 73 percent above the 10-year average and 93 percent above the long-term average.

"The significant increases we have observed the last few years," Herbert explains, "are a result of excellent water conditions on the prairies over the last five years in combination with good upland nesting conditions on both native rangeland and the millions of acres provided by the Conservation Reserve Program. The support of hunters and others who continue to promote habitat enhancement efforts through their purchase of state and federal duck stamps and their contributions to Ducks Unlimited can't be underestimated." ■

Fourth place—Robert Kercher



An Owl

for All Times

by Jerry Kustich

SEVERAL YEARS AGO my wife and I were on a midsummer trip to Lewistown, enjoying the sights along Highway 191 south of Harlowton. The verdant countryside took on the deep tones of twilight while the last of the sun's rays poked through a late-evening buildup of cumulus clouds on the horizon. Then, coming into view in the distance was a clump of something on the highway, a few feet from the shoulder. And since there was some detectable movement as well, we assumed it was still alive. There on the road, in a huddled mass, were four goofy-looking owlets in various stages of development. Wide-eyed and nervous, fuzz and feathers sticking up everywhere, they had apparently lost their way.

JIM HEUSTESS

RICHARD MOUSEL

Since leaving this quivering ball to the whim of the next passing vehicle was not even a consideration, we quickly pulled over. As I approached the youngsters, one by one they struggled off the ground and flew to the safety of an adjacent field. The smallest, however, weakly glided toward a barbed wire fence, where a protruding barb pulled the unsteady bird from the air like a magnet. There it placidly hung upside down by its knotted undercoat. At the same time the mother, a frantic short-eared owl, flew in circles over my head, voicing her concern.

Safely extracting the owlet and gently sending it in the direction of its three siblings, I assured mom that my clumsy rescue effort likely beat the alternative. For just as she came to rest on a fencepost not far away, an 18-wheeler cruised over the spot where the young owls had been standing only a few moments earlier. Her piercing yellow eyes still glared in our direction as we got back in our vehicle and drove off into what was left of the sunset.

The short-eared owl, *Asio flammeus*, is found at least seasonally on every continent except Australia. The fact that its color varies throughout the world may explain the species portion of its Latin name, *flammeus*, meaning fiery or flaming. The plumage of some European birds suggests a flame-like appearance, although this is not apparent in the North American form. The bird's common name derives from two short tufts of feathers that barely stick above each side of the forehead. These "ears" have nothing to do with hearing. In fact, the actual auditory holes are located under the facial disc in all owls.

The short-eared owl stands 15 inches tall, with a wingspan of about 28 inches. Apart from the two lemon-yellow eyes set deep into cups of black feathers, the face is buff, outlined by a white edge. Brown streaking on the chest contrasts with darker patterns on the back and wings. In flight, the wings display a buff patch on top, a black crescent underneath the bend, and black tips. When perched, the owl's rounded head appears to have no neck.

The short-ear is a swift, efficient flier, qualities needed to cover the vast open areas it calls home. My first observation of this species occurred along the coast of northern California one drizzly day. As the owl fluttered like a moth while scanning a green February pasture in search of lunch, its long wings somehow made it appear larger than it was. Attracted to marshes, dunes, grasslands, and prairies, short-eared owls find much of Montana to their liking, particularly east of the Continental Divide. In fact, they breed throughout much of the state.

Although it is a very efficient night predator, the short-ear also hunts regularly during the day. Often active at dawn and at twilight, its daytime activity increases during the breeding season, especially on gray, cloudy days. This species is common well north into the tundra regions of the Arctic, which may partially account for its orientation to daylight.

Since perches are limited in its preferred habitat, the short-eared owl uses the ground well. It can hide in depressions and behind clumps of grass. Where there are no bushes or posts, hummocks and rises are used as lookout perches. Nests are scraped in the ground and lined with grass and feathers. Although nests typically contain four to seven eggs, more or fewer eggs may be laid in response to the available food source in any given year.

During courtship, the male puts on a showy aerial display. Climbing high into the air, it descends in a series of downward swoops, using its wings to create a loud clapping sound, not unlike the sound a flag makes when whipping briskly in the breeze. Although this activity usually takes place at

MARK PETERS

Opposite page: *Two short ear tufts, not always visible, give the short-eared owl its name.* **Left:** *Since they are primarily birds of open country, short-ears nest on the ground. Clutch size is 4 to 10 with owlets fledging in 30 to 40 days.*

MILO BURCHAM

Small rodents like voles and deer mice (below) make up the bulk of the short-eared owl's diet. Studies indicate that food abundance plays an important role in regulating the breeding habits of these birds. They may vacate a traditional breeding area when mice and voles are scarce to seek a location with a better food supply.

MILO BURCHAM

twilight, it can occur throughout the day. In between these courtship flights, this usually quiet owl will woo his "loved one" with a series of wailing *too-too-toots*.

Short-eared owls seem uncommonly gregarious. A few Octobers ago I watched three of them leapfrogging from fencepost to ground to fencepost in a pasture west of Wisdom. Most owls exhibit some migratory movement, often in response to changing food supply, and I could only assume these birds were about to leave this frigid part of Montana for the winter.

Versatile hunters, short-ears eat a variety of prey, including rodents, small birds, and insects. Meadow mice and voles, however, make up the bulk of their diet, and on the tundra they consume great numbers of lemmings. Both in Europe and North America, large gatherings of short-eared owls sometimes materialize out of nowhere to deal with heavy rodent infestations. Scottish history attributes control of a plague of short-tailed voles in the 1890s to short-eared owls, whose numbers increased dramatically during the period.

In 1996 the National Audubon Society introduced its "WatchList"— a red-flag alert including 90 birds that are undergoing population declines primarily as a result of habitat fragmentation. Compiled by both the Partners in Flight and Audubon organizations in conjunction with the work of many scientists and volunteers, the list is regularly updated utilizing systematic bird counts. Sadly, the short-eared owl appears on the list.

While this bird has declined in parts of North America, particularly in the eastern portions of its range, its status in the West is more difficult to assess. Dennis Flath, nongame coordinator for Montana Fish, Wildlife & Parks, points out that short-eared owls tend to be nomadic on their breeding range from year to year in response to prey availability. "Population surveys," says Flath, "depending on where and how they are conducted, may show this bird to be abundant one year and scarce the next, or vice versa." He adds that the Conservation Reserve Program (CRP) has done much to improve breeding and habitat conditions for short-eared owls across the northern plains over the past decade.

Because most owls are strictly nocturnal, it is difficult for us to observe them without making a concerted effort. While most of the world sleeps, these creatures of the night take watch of a realm more foreign to many of us than outer space. Yet, a few owls, like the short-eared, are "diurnal" species that function effectively in the world of daylight as well. As watchers of wildlife, this is our good fortune, since daytime observations can provide insights into the lives of these fascinating raptors and leave impressions that will last a lifetime. The short-eared owl is, indeed, an owl for all times—morning, evening, day, or night—and, we hope, forever. ■

Taking a Fling at Ling

by Steve Dalbey

IT'S A STARRY WINTER NIGHT on northwestern Montana's Lake Koocanusa. Ice fishing rods are propped up on mounds of snow and rod guides are icing up from the subfreezing temperatures. Attired in dirty coveralls and snow packs laced with creepers for sure footing, ling fishermen sip hot chocolate and feed a bonfire as they wait in the darkness for a telltale tug on the rod tip.

The stories flow about previous years' fishing trips and the whoppers caught. Every so often the old-timers pull out their glass jars filled with "ivories" and shake them ceremoniously over the ice-fishing hole. These ivories are otoliths, or ear bones, removed from ling over the course of many years of fishing.

Then it happens...the rod tip dips as something in the cold depths mouths the bait. The angler waits, allowing the ling to swallow the hunk of fish. He finally lifts the rod, gingerly testing the line tension to determine if the fish is still there. Finally, with a sweeping motion of the rod, he sets the hook...and the battle is on. Ling are not noted as drag-frying, line-stripping acrobats, but a good-sized one will put a smile on any angler's face.

Once landed, the mottled, snaky-looking fish is tossed on the ice, where it will remain until the angler heads home. Fishermen skilled at cleaning these slimy creatures can look forward to gourmet dining on boneless, delicately flavored fillets.

The ling, officially known as the burbot (*Lota lota*), is native to all major drainages in Montana with the exception of the Clark Fork. It is the only freshwater representative of the cod family (Gadidae), and it possesses the distinction (along with northern pike) of having the widest longitudinal distribution of any freshwater fish species in the world. Ling, like all codfish, are smooth-skinned with tiny scales and one large barbel in the middle of the chin. They also have two dorsal fins with no spines. The scientific name *Lota* comes from the French word "*la lotte,*" meaning codfish.

In Montana this cold-water species inhabits primarily large lakes, reservoirs, and rivers, but stream populations are not uncommon. Ling are found even in some headwater mountain streams. The Bighole River drainage in southwestern Montana contains one of these unique populations.

The current state record ling, caught in 1989 by Jeff Iwen in the Missouri River near Wolf Point, weighed a tad over 17 pounds. According to longtime FWP fisheries biologist Phil Stewart, the area below where the Milk River empties into the Missouri has a reputation for growing the state's largest ling.

Several factors make the ling unique, aside from its eel-like appearance. First, it thrives only in water colder than 55 degrees F. In some eastern Montana waters—for example, the lower Yellowstone River—warm water temperatures in summer may limit ling populations. Fish may use this portion of the river in winter and spring, retreating upriver or moving downstream to the Missouri to find cooler water during summer and fall.

Ling spawn in mid-winter (January and February), often under the ice, when water temperatures are at or near freezing. Alaskan ling are particularly fecund, with some females bulging with up to 3.5 million eggs! Spawning takes place in large aggregates of ling called "spawning balls." Females release the tiny, nonadhesive eggs in open water to be fertilized by males in the writhing mass of fish.

The fertilized eggs drift for a short time, but soon sink to the bottom of the lake or river. Hatching time varies depending on water temperature; at 43 degrees F., the eggs hatch in 30 days. The larvae feed on zooplankton until they reach a length of about 1.5 inches.

As ling grow they begin to eat insects and small fish, eventually becoming more solitary and nocturnal. Active night feeders, larger burbot feed almost exclusively on fish. Yellow perch, which are generally inactive at night, are a favorite food item.

Ling often hide in rock crevices during the daytime. In northwestern Montana's Kootenai River, huge boulders placed in the river during construction of Libby Dam inadvertently created ideal habitat for the nighttime predators. After dark, scuba divers routinely observe ling moving out of the car-sized boulders into the concrete-lined stilling basin to feed on kokanee salmon flushed through the dam.

In some drainages, river-dwelling ling populations have been adversely affected by hydropower development. Dams block upstream passage of fish and change the natural flow regime. To maximize generation of electricity, power companies sometimes sharply increase flow of water through the turbines for short intervals, a practice known as "power peaking." This pattern of fluctuating flows is often greatest during winter when ling are spawning. The resulting increase in water velocity and altered water temperature (usually warmer) may inhibit spawning migrations. The Idaho Fish and Game Department is currently investigating the possible impacts of Libby Dam on burbot populations in the lower Kootenai River.

Another dam-related impact is the reduction in overall productivity of the river system. Reservoirs act as nutrient sinks, capturing a high percentage of incoming nitrates and phosphorous. The water released is nutrient-poor, which can impact small fish more than large fish. In the Kootenai drainage, studies have shown substantial reductions in orthophosphate levels since the construction of Libby Dam. Orthophosphate has been shown to be highly correlated with survival of ling fry.

Dams, however, are not the sole cause of declining ling populations; overharvest can play a role as well. Anglers can easily target ling if conditions are right. Those conditions appear to have existed in the west arm of Lake Kootenay in British Columbia during the 1960s and 1970s, when anglers from across the Northwest congregated on what were locally known as "ling beds." Reports of gunnysacks and garbage cans full of ling were common. Limits were not imposed until 1983, and by 1992 the

FWP PHOTO

At Lake Kootenay in 1969, the harvest may have exceeded 25,000 ling.

JIM LIEBELT

FWP seasonal employee Shawn Goodchild holds a burbot captured during fish monitoring work on the Missouri River below Fort Peck Dam.

population had declined to the point where the Idaho Fish and Game Department closed the Idaho portion of the Kootenai River upstream from Lake Kootenay to ling fishing. In Montana the Kootenai drainage still supports a five-fish limit, although Lake Koocanusa is closed from January 15 through February 28 to protect ling during the spawning period. Biologists from both Montana and Idaho are working to reverse the decline in ling numbers that began in the Kootenai River decades ago.

In general, ling populations east of the Continental Divide in Montana appear stable, although data aren't available for some areas. Popular fisheries have developed on reservoirs like Clark Canyon and Canyon Ferry. The Stan Shafer Memorial Ling Derby on Clark Canyon Reservoir lures up to 500 anglers from around the region each winter for fun, money, and prizes.

In areas where ling populations have seriously declined, FWP has stepped up efforts to learn more about the species' spawning, growth dynamics, and food habits. Biologists in Libby began to survey burbot distribution in the Kootenai in 1991, when FWP fisheries technician Tom Ostrowski designed a unique sampling scheme that incorporated scuba diving below Libby Dam. Transects are laid out on the bottom of the stilling basin and ling are counted by divers during the night throughout the winter. These efforts, which resulted in the first observation of ling spawning in the Kootenai, led to experiments at the Libby Field Station to artificially spawn ling. The ling is one of few remaining species for which artificial propagation techniques have not been established.

In addition, genetic sampling has been completed throughout the Kootenai drainage and at several sites across Montana. Results from these studies reveal genetic differences in ling populations east and west of the Continental Divide, indicating that unique life-history patterns have evolved over time. Better understanding of these population differences will help guide FWP management and conservation efforts in the future.

Dr. Calvin Kaya, a Montana State University professor of aquatic biology and authority on Montana's native fishes, fears the burbot could follow a path of decline similar to that of some other native fish species. Kaya points out that the bull trout, once considered a nuisance predatory fish, is now on the federal endangered species list. In Idaho at least one conservation group has discussed petitioning the U.S. Fish and Wildlife Service to recognize the burbot as an endangered species.

In the meantime, on Montana lakes and reservoirs where ling remain abundant, dedicated ice fishermen keep their night-time vigil in hopes of landing one of these odd-looking but savory fish. With knowledge gained from population surveys and genetic research, stories of monster ling should continue to swirl around the bonfires at lakes like Koocanusa, Canyon Ferry, and Clark Canyon for many decades to come. ■

MIKAL KELLNER WINS "THE VINNIE"

One of Helena's best known animal advocates has been recognized as one of Montana's outstanding wildlife supporters. FWP recently awarded Mikal Kellner the Vincent Yannone Ambassador for Wildlife Award (The Vinnie) for 1998. The award is designed to recognize Montanans whose work, words, or spontaneous deeds of campassion directly aid in the conservation of Montana's wildlife.

"She has a wonderful, gentle way of working with children and her love of animals and concern for their welfare is easily transferred to her audience," said Cindy Utterback of Helena in the letter nominating Kellner for the award.

Kellner believes that education is the key to survival for wildlife. "A woman with the Wildlife Conservation Society said all the efforts to save wildlife are for naught if we fail to sow the seeds of environmental ethics in the next generation," Kellner said. "I really believe that. There is not an awareness today that there needs to be to save wildlife and species."

She helped renovate the duck pond at the Lewis and Clark County Fairgrounds and spends time each week cleaning up and maintaining the area. A long-time animal advocate, Kellner was instrumental in organizing the Lewis and Clark Humane Society and in 1989 won the national American Veterinary Medical Association Award for that effort.

"She just loves animals. She has always been active in animal causes and animal education, it's a passion for her," Utterback said.

Kellner, who owns two dogs, said her love for nature grew during her childhood when she spent summers on Lindbergh Lake in the Seeley-Swan.

She was chosen for the Vinnie award from among seven nominees. The Vinnie was named for Vincent Yannone, who spent 25 years at FWP as a wildlife educator and advocate.

"This award means so much to me not only because Vince Yannone is a personal friend but because I've admired him for so long for his dedication to wildlife," Kellner said. "It is such a privilege to receive an honor in his name.—*Paula Clawson, The Independent Record*

RON AASHEIM

Helena wildlife advocate Mikal Kellner receives FWP's "Vinnie" award from department director Patrick J. Graham.

James King's hooded merganser

MISSOULA ARTIST WINS 1998 MONTANA JUNIOR DUCK STAMP CONTEST

James King, age 12, of Missoula, took top honors out of more than 400 entries in the 1998 Montana Junior Duck Stamp Contest. His acrylic painting of a hooded merganser, entitled "Reflections," went on to place in the top ten in the national junior duck stamp competition. James won a $250 savings bond from Montana Fish, Wildlife & Parks, and other awards donated by local sponsors.

James comes from a family of gifted wildlife artists. His mother, Roberta, is a professional artist who offers lessons to children entering the contest. James' younger brother, Michael, won first place in his age division for his watercolor of a wigeon.

The Junior Duck Stamp Contest is the annual culmination of a program called "Conservation through the Arts," which meshes wetland and waterfowl conservation education with the visual arts. The contest is open to all children from public, private, and home schools, grades K-12. The Montana winner goes on to a national competition; the national winner is then made into a

Federal Junior Duck Stamp, available for $5. All proceeds from the sale of Federal Junior Duck Stamps support conservation education.

For more information on the Montana Junior Duck Stamp Contest, contact: Emily Miwa-Vogan, Montana Junior Duck Stamp Coordinator, Lee Metcalf National Wildlife Refuge, P.O. Box 247, Stevensville, MT 59870; (406) 777-5552, ext. 202.

The Montana Junior Duck Stamp Program is sponsored in part by the Lee Metcalf National Wildlife Refuge, Montana Fish, Wildlife & Parks, Rocky Mountain Elk Foundation, Montana Ducks Unlimited, Maries-art-eries, Teller Wildlife Refuge, and Bitterroot Audubon.

FWP Bear Biologists Receive Awards

Frey

Three FWP biologists specializing in management of bears were recently honored by the Interagency Grizzly Bear Committee (IGBC).

Receiving the awards were: Kevin Frey, bear specialist for the Greater Yellowstone Ecosystem, who is headquartered at FWP's Region 3 office in Bozeman; Mike Madel, the state wildlife agency's bear management biologist along the Rocky Mountain East Front; and Tim Manley, a bear researcher based at FWP's Region 1 office in Kalispell who has spent much time developing

Madel

Manley

aversive conditioning techniques to prevent recurrent bear problems in areas highly populated by humans.

The three men were recognized by the multi-state and federal agency committee for their "outstanding contribution to grizzly bear recovery and conservation by working closely with local people to resolve human/grizzly bear conflicts." The plaques they received in conjunction with their awards stated: "Your time, commitments and leadership are appreciated."

Chris Smith, chief of staff for FWP in Helena, lauded the three award recipients for "their outstanding work in managing grizzly bears in Montana and their efforts to further the recovery of the species. Their exemplary efforts are helping to ensure that grizzly bears and people can coexist even as we move into the world of amazing technological advances and human population growth promised for the 21st Century."

The Warden's Corner

Two Cubs for the Price of One

by Steve Andersen
Region 1 Game Warden (Troy)

Editor's note.—With this issue, we're introducing a section called "Warden's Corner." In it you'll find news items, short articles, and occasional stories provided by field wardens around Montana. In this inaugural column, Troy game warden Steve Andersen describes the capture of two orphaned bear cubs that needed FWP's help until they could grow large enough to fend for themselves. Of his bear-capturing adventure, says Andersen, "Catching poachers may be easier."

Overstuffed clouds were about to burst their seams with snow when I met Keith and Betty Mack at the mouth of Pine Creek Road in "the Yaak." "He should still be there," said Keith. "He was just sittin' under a spruce tree shiverin' when we saw him."

Keith had called me the night before to report a lonely bear cub that had been raiding a trapper's set for the bait. The trap had been sprung by a marten and the black bear cub was interested in the chunk of beaver carcass the trapper had used for bait. Keith and his son had been training his young hounds on the Pete Creek Road when he spotted the cub near the marten set.

Snowflakes settled lightly on our shoulders as we unloaded an array of cub-catching accouterments from the back of my truck. "Well, what's the plan?" Keith asked, as I handed out an 8-foot snare pole with a retractable noose on one end. Next came the portable dog kennel, an old tarp, thick gloves, and a 14-foot wooden canoe pole.

"Pretty much anything goes," I responded. "Unless we get lucky right away, we're probably in for a game of catch-me-if-you-can." Bear cubs love to climb up and down trees, teasing the mere mortal on the ground by staying just out of reach. "All set?" I asked, surveying our primitive armaments. We looked like a medieval band of peasants intent on an uprising.

After a few steps along the trapper's trail, we spied the young bruin about 10 feet up a tall spruce tree. Appearing to weigh about 15 pounds, the cub studied us with an

DONALD M. JONES

A black bear cub gets ready for a spirited game of "catch-me-if-you-can."

air of indifference. Stalking quietly up to the tree, I extended the snare pole toward the cub, but he was just out of range. I inched closer and reached out with the noose, but the bear bolted upward at the last second.

"The pole!" Keith yelled, as bits of bark rained down from the scampering cub. I grabbed the canoe pole, but the uneven terrain proved to be the bear's ally. Like a human metronome, I swung the wooden staff from side to side, but the ground gave way as I took a step. I staggered backwards like a drunken pinata player, but by now the cub was 30 feet up and sitting nonchalantly on a limb. I swear I saw him stick out his tongue.

"Well," I said, "we might as well go back to the road and wait. He'll come down in a few minutes, and we'll try again." We hiked out to the road. The snow continued to fall as we peered through the roadside brush to gauge the cub's position. After a few minutes we decided to check on our feisty friend. He was gone.

Keith picked up his tracks in the fresh snow and we followed them deeper into the woods. The tracks led into an impressive stand of timber dominated by stout spruces and enormous cottonwoods. "There he is," said Keith.

Our approach this time was greeted with far more suspicion and angst. We were 25 feet from the tree when the bear decided that would be far enough. "I'm going to get a shotgun," I announced. Betty Mack gave me a look of grave concern. "With some cracker shells, I may be able to make him nervous enough to come down."

Within minutes, I was standing in a clearing feeding cracker shells into the Remington pump. With Betty and Keith poised near the base of the tree, I began a barrage of arcing shells that exploded in mid-air near the bear. Clearly upset with our rendition of the Mardi Gras, the stubborn cub began a slow descent. Confident now that we had the solution, I paused to feed more shells into the scattergun when Betty said, "Oh, no! There's another one." She was pointing up at a giant cottonwood that held the twin to our nemesis. In unison, Keith and I said, "I'll be damned!"

As if responding to our frustration, the second cub began a slow descent on his own. Temporarily abandoning the effort for the first cub, Keith and Betty hurried toward the base of the cottonwood to await his arrival. I stayed in the clearing and launched a cracker shell above him for good measure.

"Ten feet," I narrated, as Betty and Keith hid beneath a bushy hemlock at the base of the cottonwood. "Six feet." The bear was coming down on the opposite side of the tree, out of sight from Betty and Keith's position. "Wait till he hits the ground," I cautioned. "Three feet."

Keith was poised for the strike like an old mountain lion desperate for one more meal. Betty held up the canvas to block off an escape route. "He's almost on the ground...now!"

Keith lunged deftly around the tree and pinned the cub with gloved hands. "Good job," I yelled. Keith held up his trophy by the scruff of the neck, the young bruin hanging helplessly. Betty propped open the kennel door and they stuffed the struggling bundle into the kennel. "One down and one to go," Keith beamed.

Refocusing my attention on the obstinate cub that started this affair, I was more determined than ever. I lobbed several cracker shells above the "little cub who wouldn't," the explosions shattering the serenity of the snowy scene. Then I took careful aim and plunked him in the butt with a beanbag shell. Still, he refused to budge.

I was out of shells, out of ideas, and out of patience when from the kennel arose a mournful wail, a bawl so lonesome and sad it could only come from a sibling who had just been separated from his twin. The effect was instantaneous.

With a new resolve that hollered, "I'm coming," the intractable bear began a steady descent. He paused halfway down and shot me a worried look. "We'll back off," I said. Betty and I walked conspicuously toward the old cottonwood. Keith had taken a position under the tree, out of the cub's sight. Confident we weren't a threat, the little bear continued down.

Twelve feet from the ground, the cub discovered Keith, but the bawling from his sibling was too powerful to resist. He was six feet from the ground when Keith made his move. He sprang forward and tried to grab the cub by the back leg, but the frenzied bear began scurrying back up the tree. A limb reached out and swatted Keith's hat off as he leaped up again. The bear was out of reach.

Keith lurched frantically for the 14-foot pole. The bear continued its escape as Keith swung the pole back and forth. On his third and probably last swing, the pole nudged the cub on the butt, swinging its rear legs out from the tree. Betty and I were wide-eyed as the cub dropped from the tree and landed softly in the snow. Keith was on him in a flash.

We rushed over to get a look at the unmanageable culprit. The mischievous expression surrounding the brown-nosed muzzle said it all.

A NEW SPECIES OF BAT FOR MONTANA

by Tom Lemke
Wildlife Biologist
Region 3 (Livingston)

Sometimes important advances in science simply fall from the sky, literally. Through a series of fortuitous events, a species of bat new to Montana—the eastern red bat *(Lasiurus borealis)* —was recently documented. In early September of 1997, when Karen Gray stepped out into her rural backyard 12 miles west of Ismay in southeastern Montana, something hit her in the head and fell to the ground. Her cat quickly pounced on the animal and killed it. The unidentified flying object turned out to be a bat. Concerned about the possibility of rabies, Mrs. Gray kept the bat and gave it to a veterinarian from Wibaux who just happened to be testing cattle on a nearby ranch.

DR. M.D. TUTTLE

Eastern red bat

The specimen was quickly sent to the Department of Livestock's Veterinary Diagnostic Laboratory in Bozeman where they test animals for rabies. Like more than 90 percent of bats examined, this bat tested negative; however, Katy Brozovich, who works in the Virology Section, thought this particular bat looked a little different from the hundreds of bats she had examined before. She decided to save the specimen rather than destroy it—a very fortunate decision.

Almost a year later, word of a potentially interesting unidentified bat at the Bozeman lab found its way to me via Kristi DuBois, FWP biologist in Great Falls. A quick call to Katy in Bozeman resulted in a visit to the lab. Sure enough, from the depths of a freezer emerged an adult eastern red bat, the first specimen positively collected in Montana in over 100 years. Prior to this the only potential red bat from Montana was a single specimen in the U.S. National Museum (Smithsonian), collected on the "Yellowstone" in the 1800s, without a precise location, date, or collector.

Finding a new species of mammal in Montana does not happen every day. This was a rare event and people at the diagnostic lab were excited about the news. Thanks to Karen Gray and especially Katy Brozovich, science and our knowledge of bats had been advanced. We were all pleased with this fortuitous "once in a lifetime" discovery.

Well, less than a week later Katy called me, "Tom, you're not going to believe what just happened, another red bat just arrived." This specimen was collected on September 5, 1998, by Merwin Works near Sixmile Coulee, 17 miles west of Big Sandy in north-central Montana. While cutting weeds, Mr. Works found this bat roosting on a kochia plant. This red bat also tested negative for rabies.

Eastern red bats have a wingspan of 11.5 to 12.5 inches and are distinguished by short, rounded ears; beautiful, long, bright-orange to yellowish-brown fur often "frosted" with light tips; and a heavily furred tail membrane. They typically roost alone in deciduous trees or shrubs.

Red bats inhabit most of the U.S. and southern Canada, but are conspicuously absent in the Rocky Mountains from British Columbia to portions of New Mexico. Over much of their northern range red bats are migratory, flying several hundred miles between winter and summer homes. They do not hibernate during the winter like most Montana bats. Mating occurs just before or during fall migration. It may not be an accident that both Montana specimens were found in September. They may have been migrating through Montana from Canada or North Dakota.

As a result of these red bats, FWP is working with the diagnostic lab to help identify more bats to species. Looking a bit more carefully at the dozens of bats submitted annually to the lab could lead to a better understanding of bat distribution and another "scientific breakthrough" falling from the sky.

DIVERGENT VIEWS ON TRAPPING

Instead of entitling your article about trapping "The Call of the Wild" (November/December 1998), you should have named it "Montana's Dirty Little Secret." I would be as proud to claim a trapping "heritage" as the death camps of Germany or a thriving pornography business.

I am a woman and a wildlife artist. The outdoors are my life and livelihood. I will testify that one does not have to rain down death to be knowledgeable about or appreciative of nature.

There is nothing "beautiful and inspiring" about the agony and fear endured by a trapped animal. Trapping is brutally senseless—all of the animal is *not* used, only its hide. These creatures deserve a better death than one which only satisfies human vanity.

To call trapping "management" is hubris in the extreme. Predators are limited by the prey base. If some people feel they are taking too many game animals, it would be wiser to look to the real source of some declining game numbers: the degradation and loss of habitat from human causes like livestock overgrazing and wetland draining.

Trapping is a barbaric heritage to be ashamed of. I am ashamed to be considered part of the same species as those featured in your article. Trapping should die a timely death in a society that considers itself civilized.—*Mary Saunders, Winston, New Mexico*

BRAVO! to John Fraley's article "Call of the Wild" in the November/December 1998 issue. My father was a trapper all his life. I have several of his diaries of the 40's and 50's where he writes about checking his trapline and how trapping helped feed and clothe his family. In the 50's and 60's my sisters and I would accompany him on his trapline. These are some of the best memories I have of time spent with my dad. He taught me respect for wildlife, how to read beaver sign and how to be a steward of the land.

I married a trapper; we both respect the land and the animals that inhabit it. We know that with more and more human occupancy there is a need to trap to maintain healthy furbearer and predator populations for future generations to enjoy.

Mr. Fraley's article was a tribute to those who still feel that the heritage which was the foundation of Montana's being is still alive and well.

The article entitled "In the Footsteps of the Mountain Men" was also enjoyed by our family.

It was a little over 20 years ago that my husband came across your magazine in the waiting room of the doctor's office. He was immediately impressed and we have been readers and subscribers ever since. I apologize for not extending our thanks sooner for the excellent job you are doing in portraying Montana as we really are, hunting, fishing, wildlife viewing, or trapping; you have always put forth an honest effort to tell it like it is.

Thank you and keep these types of articles coming.—*Fran Buell, Gildford*

This is in response to your recent article on trapping in Montana. To refer to Montana's furbearers—especially mink, marten, otter, and wolverine—as simply a "renewable resource" both overlooks their important non-economic values to the people and places of Montana, and runs the risk that we will take for granted that these species will be around forever. The article failed to emphasize that there are ever-increasing challenges to maintaining our full array of wild forest predators, primarily due to the fact that more people are increasing their activities and developments in the forest where these animals live. Whether we value them as "forest predators" or as a "renewable resource," we all need to keep in mind that we must do our utmost to stop and where possible to reverse the ever-escalating threats to Montana's wildlands. Thanks again for raising awareness of Montana's precious natural heritage—its furbearing forest dwellers—and the importance of keeping their populations healthy and intact.—*David Gaillard, Predator Project, Bozeman*

I worked in Montana in '63 and '64 doing road work. We repaved the new road at the north edge of West Yellowstone after the 1959 earthquake.

I read all the stories in the November/December issue. The ones I liked the best were "Sentries in the Clouds" and "In the Footsteps of the Mountain Men." I used to trap too, so it was real interesting. I don't understand how the ladies stay so clean on a trapline—maybe they do things differently now than in my day!

The story about trapping and moving goats was unusual—more of the same would be fine by me. I hope to see more good stories—thanks for a nice magazine.—*Elliot Winters, Osage, Minnesota*

I applaud your recent article on trapping in the Nov./Dec. issue of *Montana Outdoors*. Although not everyone considers trapping a "legitimate sport," it is articles like yours and appropriate education that will help eliminate some of the inappropriate emotional stigma that has been levied against trapping of late.—*Bill Boehme, Kalispell*

Thanks for the informing and delightful article on trapping in

Montana Outdoors. It is a joy to see the spotlight put on this great American tradition. Looking foward to more.—*Corey Huebner, Missoula*

More on Weasel Skin Coat

Being a serious student of the 1804-1806 Lewis and Clark Expedition, I am curious in knowing where John Fraley received his information that Sacajawea made a coat for Lewis comprised of numerous ermine or weasel skins as reported in "Call of the Wild" (November/December issue). If you pursue the journals, you will note that it was Shoshoni chief Cameahwait, Sacajawea's brother, that actually gave the tippet to Lewis. The tippet was composed of 140 long-tailed weasel skins, and Lewis brought it to Philadelphia on his return. It was here where artist Charles de St. Memin sketched him attired in it. The portrait can be viewed in Gary Moulton's edited volume 5 (p. xii) of *The Journals of the Lewis and Clark Expedition*. Note also the footnote, no. 5, p. 131, in this same volume. Since there is so much information circulated about Sacajawea, I thought I would bring this to your attention.—*Ken Walcheck, Bozeman*

John Fraley's response follows:

In Bernard DeVoto's version of the Lewis and Clark journals, Lewis writes that Cameahwait "...with much ceremony put tippets about our necks such as they themselves wore. I readily perceived that this was to disguise us...." Lewis and three of his party were riding with the Shoshones to find Captain Clark near the forks of the Jefferson River. Lewis doesn't specify if the tippets were gifts or simply loaned to them for disguise, but it is likely that this was the tippet Lewis brought back to Philadelphia. In addition, the original reference on the tippet, the Jefferson Papers as reported in Mr. Peale's Museum,*a book about C.W. Peale's museum in Philadelphia, confirms that Cameahwait did give the tippet to Lewis.*

The source for Sacajawea's involvement came from Stephen Ambrose's Undaunted Courage. *Below a watercolor of Lewis wearing the cloak, Ambrose states that "Lewis is wearing what may have been the white weasel tails Sacajawea gave William Clark for his Christmas present in 1806." Actually Sacajawea gave Clark two dozen weasel tails on Christmas, 1805, as detailed in* Undaunted Courage *and as described by Clark in DeVoto's version of the journals for that day. Ambrose does not mention how he learned that the weasel tails may have ended up on Lewis' cloak.*

In any event, the point made about Sacajawea in "Call of the Wild" stands. She most likely trapped the diminutive weasels, probably by snaring them or making simple funnel traps while around camp (Sacajawea's weasels may or may not have ended up on Lewis' tippet). This would be consistent with the activities of Shoshone women who, according to Lewis' own words, "collect the wild fruit and roots, attend to the horses or assist in that duty, cook, dress the skins and make all their apparel, collect wood and make their fires, arrange and form their lodges, and when they travel pack the horses and take charge of all the baggage; in short, the man does little else except attend his horses, hunt and fish."

Packer Misidentified

Your magazine incorrectly identified the packer on page 5 of the November/December 1998 issue ("Sentries in the Clouds"). The gentleman in the photo at the right is not Ray Gibler as your caption states. It is Hilary Gollehon, who was working for Ray Gibler. The Wayne Gollehon family has a copy of the same photo.—*Terry Gollehon, via e-mail*

Hilary Gollehon, a Choteau-area rancher, helped with the goat trapping and transporting project at Deep Creek in the 1940s. We've reprinted his picture here. We apologize for the error.—Editor

Hilary Gollehon

Square Butte or Round Butte?

In your November/December 1998 issue, you have an article titled "Sentries in the Clouds," by Bruce Auchly. This was a very interesting article. The picture on pages 2 and 3 by Richard Mousel is just beautiful but we citizens here in our community argue the fact that the mountain is Square Butte as stated in your magazine. We believe it to be Round Butte. Could you please check your files and let us know if we are right?—*Bernadine L. Fairbanks, Librarian, Geraldine Branch Library, Geraldine*

You are correct. Richard Mousel's photo depicts Round Butte, a smaller formation situated between Square Butte and the Highwood Mountains. Square Butte is shown in the picture below.—Editor

KRISTI DUBOIS

SNOW GEESE: GRANDEUR AND CALAMITY ON AN ARCTIC LANDSCAPE, by Bruce Batt, Ph.D., a Ducks Unlimited book, distributed by Willow Creek Press, P.O. Box 147, Minocqua, WI 54548 (1-800-850-9453); 1998, 82 pages, soft cover, $17.95.

As the title implies and most waterfowlers are aware, not all is well with snow geese in North America. But unlike most waterfowl crises of recent years, this one stems from *too many* rather than too few of the species in question. This beautifully illustrated book celebrates the mystique of snow geese and the places they live, and reports on the problems the birds are facing on their Arctic habitats. Unfortunately, lesser snow geese have overpopulated their tundra breeding grounds to the point where habitat degradation threatens their future. As the book points out, snow goose populations need to brought under control soon through expanded hunting opportunities or other means if we are to avoid an ecological catastrophe.

SEASONS OF THE TROUT: STRATEGIES FOR THE YEAR-ROUND WESTERN ANGLER, by Neale Streeks, Pruett Publishing Co., 7464 Arapahoe Road, Suite A-9, Boulder, CO 80303 (800-247-8224); 1998, 272 pages, hard cover, $29.95.

The author, a veteran flyfishing guide and instructor, provides a seasonal calendar for fishing western waters by breaking the angling year into five seasons: mountain spring, early summer, high summer, autumn, and winter. For each season, river conditions, trout behavior, hatches, and fishing advice are presented simply and clearly to help ease the reader onto the path of understanding. Streeks points out that most technical books on insect hatches leave the reader a little stunned—the victim of information overload. But beginning anglers want and need simple, straightforward information about bugs that will help them catch fish and learn about trout behavior—and that's what this book provides. In addition, there are more than 80 black-and-white photos, 29 color photos, and a seasonal hatch chart for quick reference.

FLY FISHING THE MOUNTAIN LAKES, by Gary LaFontaine, Greycliff Publishing Co., P.O. Box 1273, Helena, MT 59624 (406-443-1888); 1998, 190 pages, soft cover, $14.95.

In this book acclaimed flyfishing author Gary LaFontaine shares a summer's angling on mountain lakes, detailing where to find trout and how to catch them. As in his other works, LaFontaine excels as a thinker and researcher—his revelations are often at odds with conventional wisdom, and his insights are likely to change your approach to fishing these waters. Despite LaFontaine's devotion to scientific study, above all else he likes to have fun fishing, and you'll have fun going with him to places like Park Lake near Helena, the Hog Hole near his home in Deer Lodge, Cave Lake in the Crazies, and some remote and hard-to-reach high-country jewels.

WESTERN WINGS: HUNTING UPLAND BIRDS ON THE NORTHERN PLAINS, Ben O. Williams, Wilderness Adventures Press, P.O. Box 627, Gallatin Gateway, MT 59730 (800-925-3339); 1998, 200 pages, hard cover, $35.

Upland bird hunting on the northern plains can be daunting, especially to newcomers: too much country, too few birds. Knowledge of the prairie and the birds that live there—the sharptail, prairie chicken, sage grouse, and Hun—comes at the expense of a lot of boot leather. Montanan Ben Williams has worn out plenty of boots over the past 40 years following his Brittanys through the grasslands of Montana, the Dakotas, Nebraska, and other states, and his book will help you understand the subtle differences in these prairie habitats, the birds that occupy them, and how to hunt them. Some added bonuses: a dust cover painting and inside sketches by Montana artist Russell Chatham; numerous black-and-white photos and an 8-page section of color photos; and several pages of upland gamebird recipes.

ECOLOGY AND MANAGEMENT OF THE NORTH AMERICAN MOOSE, compiled and edited by Albert W. Franzmann and Charles C. Schwartz, a Wildlife Management Institute book, distributed by Smithsonian Institution Press, P.O. Box 960, Herndon, VA 20172-0960 (1-800-782-4612); 1998, 640 pages, hard cover, $59.95 plus $3.50 postage and handling.

Without doubt the most comprehensive book ever published on North American moose, this Wildlife Management Institute book details taxonomy, reproduction, feeding habits, population dynamics, behavior, relationships with predators, and seasonal migration patterns. Twenty-one of the world's foremost authorities contributed to the book, which offers wildlife managers, researchers, hunters, and conservationists a wealth of information on the biology and management of this unique big game animal.

CLASSIC FRESHWATER FISH COOKING, by Eileen Clarke, Voyageur Press, P.O. Box 338, Stillwater, MN 55082 (1-800-888-9653); 1998, 128 pages, hard cover, $24.95 plus $3.95 shipping.

Eileen Clarke's book is packed with nearly 100 time-tested, lip-smacking recipes for trout, salmon, walleye, northern pike, bass, and more. From "Lemony Stuffed Walleye Rolls" to "Trout Almondine," these proven recipes from around the world will make any dinner a treat. Nicely illustrated with color photos of fish, fishing scenes, and prepared dishes, the book contains more than recipes. There's also good information on freezers and freezing, wrapping and packaging, thawing (naturally or by microwave), filleting fish, and sharpening knives.

MONTANA OUTDOORS

MARKET

Henley

This preshrunk, 100% cotton, long-sleeve shirt can be worn alone or as a base for layering. Available in *natural, leaf,* and *lake (shown)*, with embroidered mule deer, in sizes M, L, XL. **ITEM #1301-6 $29.95**

natural *leaf* *lake*

Made in Montana Vest

Windproof, water-repellent nylon shell with non-pilling polyester fleece lining that looks, feels, and breathes like cotton. Available in *black*, with embroidered Montana Outdoors logo, in sizes M, L, XL, XXL. **ITEM #6530-1 $58.95**

Denim Shirt

Generously cut for comfort, this 100% cotton shirt has button-down collar and embroidered trout and fly design. *Blue* denim shirt in sizes S, M, L, XL. *Natural* denim shirt (*shown*) in sizes M, L, XL (sorry, small not available in *natural* denim).
ITEM #1901-4 $39.95

blue *natural*

Golf Shirt

With contrasting collar, cuffs, and placket, this 100% combed cotton pique golf shirt is available in *forest green/wine/navy*; *wine/forest/navy (shown)*; and *jade/concord/royal.* Comes with embroidered Montana Outdoors logo; available in sizes M, L, XL.
ITEM #1202-1 $36.95

forest green/wine/navy *wine/forest/navy* *jade/concord/royal*

T-Shirt

This preshrunk, 100% cotton T has embroidered chipmunk detail. Preshrunk. Available in *ash, sage, straw (shown),* and *forest green* in sizes S, M, L, XL. **ITEM #1102-2 $15.95**

ash *sage* *straw* *forest green*

TO ORDER, CALL
1-800-727-2744

Phone and fax orders VISA and MasterCard only

Logo Details

Pro-Style Cap

Features an embroidered pheasant and hunting dog; has adjustable plastic strap. Available in two-tone combinations–*dark green/khaki* and *dark caramel/dark green (shown).* One size fits all. **ITEM #2302-5 $14.95**

dark green/khaki *dark caramel/dark green*

Low-Profile Cap

Detailed with dry fly and rainbow trout; has adjustable fabric strap with brass buckle. Available in *dark green, charcoal, denim,* or *two-tone* (*denim visor and khaki crown, shown*). One size fits all. **ITEM #2101-4 $14.95**

dark green *charcoal* *denim* *two-tone*

Golf-Style Cap

Poly/cotton twill with embroidered mule deer and matching braid; has adjustable fabric strap with sliding zipper. Available in *dark green, black,* or *royal.*

ITEM # 2202-6 $14.95

dark green *black* *royal*

All garments can be machine washed and dried. Colors may vary slightly from ad.

MONTANA OUTDOORS

CALL TOLL FREE **1-800-727-2744** (M-F, 8:00 a.m.-5:00 p.m. MST)
FAX ORDERS 1-800-727-2744 24 hours a day
In Great Falls, MT, call 727-5730. Phone and fax orders VISA and MasterCard only

SOLD TO:

Name _____
UPS Address _____
City _____ State ____ Zip _____
Daytime Phone _____

ALTERNATIVE SHIPPING OR GIFT ADDRESS:

Name _____
UPS Address _____
City _____ State ____ Zip _____

ITEM#	SIZE	QTY	COLOR	DESCRIPTION	PRICE	TOTAL

Total Merchandise	
Shipping & Handling	
Total Due (U.S. Funds)	

SHIPPING & HANDLING CHARGES are for each address within the U.S. (includes FPO or APO).
$0 - $60.00 ..... add **$4.50**
$60.01 - $120.00 .... add **$6.75**
$120.01 and up ..... add **$8.75**

Shipping to Canada add **$2.50**. Outside of the U.S. add **$13.75**. Shipping must be included or orders will be returned.

SHIPPING TIME
You can expect to receive your package within four weeks of placing an order with us.

PAYMENT BY:
☐ CHECK ☐ MONEY ORDER ☐ VISA ☐ MASTERCARD

CREDIT CARD NUMBER _____

EXPIRATION DATE ____ ____ (month / year)

SIGNATURE _____

Prices are good through April 1999.

SEND TO: **MONTANA OUTDOORS**
c/o Shining Mountain Images
726 6th St. NW
Great Falls, MT 59404

CONTRIBUTORS

Protective coloration in wildlife, says **SAM CURTIS**, takes a number of fascinating forms. Many bird and animal species have evolved camouflage colors to blend in perfectly with their surroundings. Some, like the ptarmigan and snowshoe hare, even change color with the seasons. Other species, like the skunk, are cloaked in warning colors that say "stay away or else." Several harmless beetles, moths, and flies rely on colors that mimic wasps or bees to keep predators at bay. To learn more about these remarkable adaptations and how they have evolved over time through a process called natural selection, turn to "Colors of Survival" on page 7. Curtis is a Bozeman-based free-lancer whose natural history articles appear often in *Montana Outdoors*.

The pallid sturgeon, a primitive fish once common in the Missouri, Yellowstone, and other major North American rivers, is now on the endangered species list. There are estimated to be fewer than 250 in the Missouri River upstream from North Dakota's Lake Sakakawea. But according to **BRUCE AUCHLY**, a cooperative stocking effort between Montana, North Dakota, and the federal government is providing "New Hope for an Old Fish" (p. 12). "Just don't expect quick results," he cautions. "Female pallid sturgeon take up to 15 years to reach sexual maturity, and the hatchery-raised pallids released last summer were one-year-olds." Auchly is FWP's information officer in Great Falls.

Auchly

By winning the 1999 Montana Migratory Bird Stamp Contest, Great Falls wildlife artist Cliff Rossberg has achieved one of his major goals. "I believe the duck stamp program is one of the finest examples of how people from all walks of life can contribute to wildlife conservation, and as an artist it's a wonderful way for me personally to contribute to the effort," says Rossberg. His painting of two Barrow's goldeneyes in flight bested a field of 14 entries. Helena information officer **WILLIAM PHIPPEN**, who wrote the article accompanying the top contest entries (p. 17), describes the stamp program and how the money derived is used for waterfowl projects.

Kustich

Since short-eared owls are birds of open country, they find much of Montana to their liking. And because they are active in the daytime as well as at night, says **JERRY KUSTICH**, this "Owl for All Times" (p. 20) offers an excellent chance for wildlife watchers to get an up-close look at a member of a mostly nocturnal bird family. The short-ear eats primarily small rodents, and its abundance from year to year and place to place is strongly tied to mouse and vole populations. "Gatherings of these owls sometimes materialize out of nowhere to deal with heavy rodent infestations," says Kustich, a writer, angler, and avid birder living in Twin Bridges.

STEVE DALBEY was introduced to ling fishing as a youngster growing up in Glendive. He has a photo of himself at age 7 holding up a good-sized ling, and these days he can regularly be found out on the ice of Canyon Ferry Reservoir "Taking a Fling at Ling" with his own children. He admits that the ling (officially known as the burbot) isn't as charismatic as a trout, but says its virtues on the dinner table more than make up for its eely bad looks. An FWP fisheries biologist, Dalbey is concerned for the ling's future. Hydropower development and overharvest have reduced their numbers in some areas, he says. For an in-depth look at this under-appreciated native fish species, turn to his article beginning on page 25. Dalbey is stationed at FWP's Helena Area Resource Office.

Dalbey and son

MO thanks the following photographers for their contributions to this issue: **MIKE BARLOW**, Livingston; **MILO BURCHAM**, Missoula; **JIM HEUSTESS**, Puyallup, WA; **MICHAEL JAVORKA**, Kalispell; **DONALD M. JONES**, Troy; **MILL POND PRESS**, Venice, FL; **RICHARD MOUSEL**, Great Falls; **JOHN G. OBREY, JR.**, Salt Lake City, UT; **JIM PETEK**, Red Lodge; **MARK PETERS**, Ephrata, WA; **MICHAEL S. QUINTON**, Slana, AK; **FRED RYCKMAN**, North Dakota Game & Fish Dept.; **DR. M.D. TUTTLE**, Austin, TX; and **TOM J. ULRICH**, West Glacier. Thanks also to the following employees who work for the department: **RON AASHEIM**, Helena; **KRISTI DUBOIS**, Great Falls; **BILL GARDNER**, Lewistown; and **JIM LIEBELT**, Fort Peck.

03
7 44040 88810 4